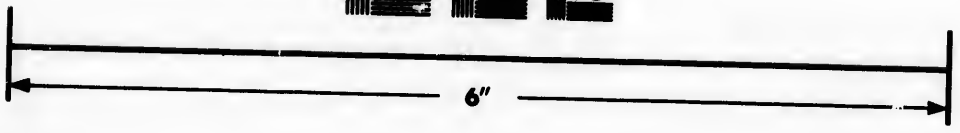
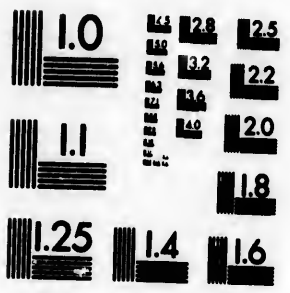


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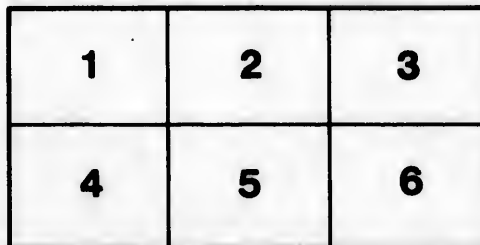
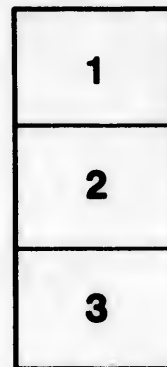
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CIRCULAR

TO THE

CITIZENS OF BUFFALO,

ON THE PROPOSED

NIAGARA RIVER TUNNEL

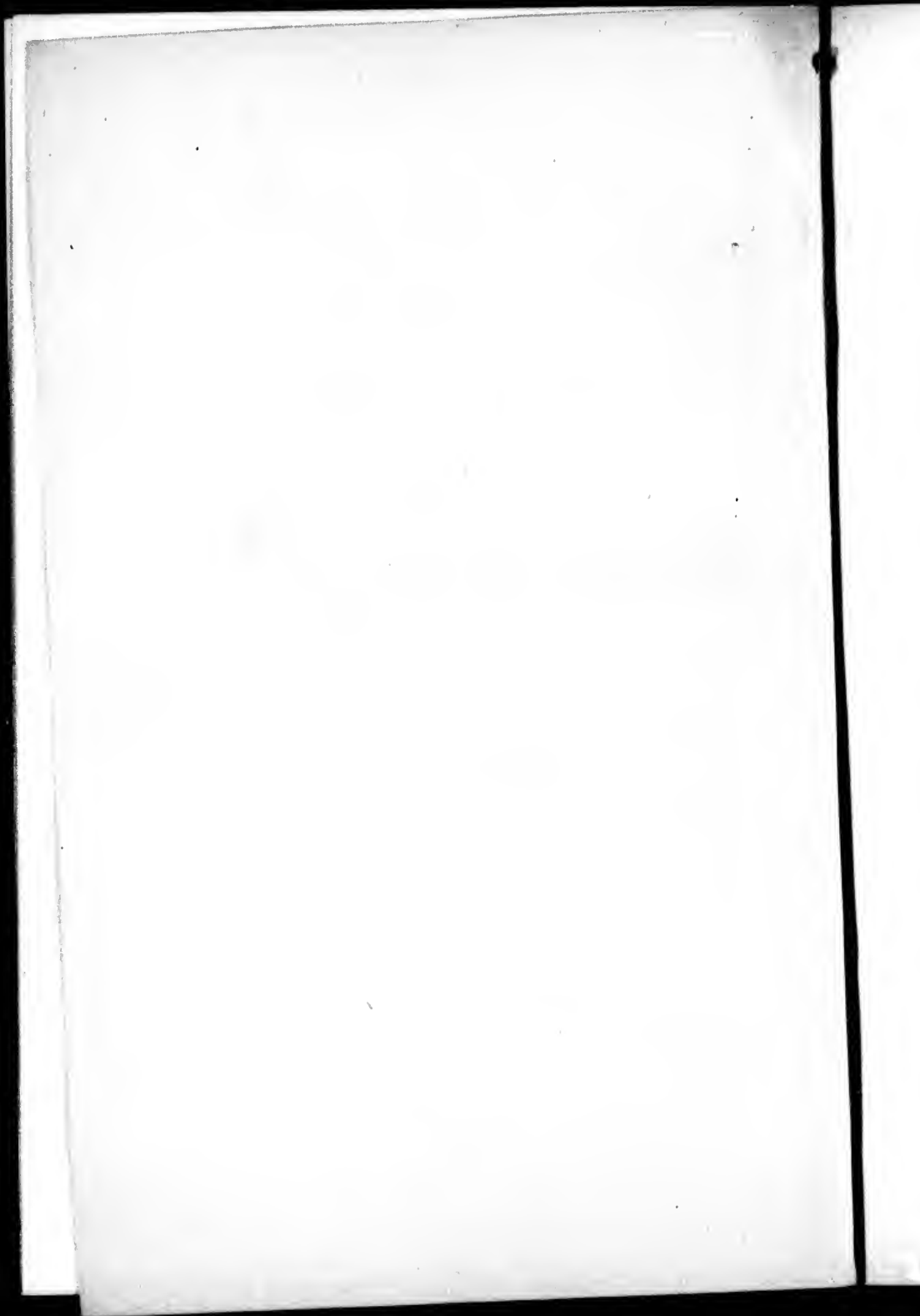
BY

WILLIAM WALLACE, ENGINEER.

BUFFALO:

STEAM PRESS OF THOMAS & LATHROPS.

1855.



CIRCULAR

TO THE

CITIZENS OF BUFFALO,

ON THE PROPOSED

NIAGARA RIVER TUNNEL

BY

WILLIAM WALLACE, ENGINEER.



BUFFALO:

STEAM PRESS OF THOMAS & LATHROPS.

1855.

1855
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Tunnel under the Niagara River.

CITIZENS OF BUFFALO:

Conflicting interests surround you on every side, and powerful combinations have already diverted a large share of the traffic into other channels, which, with proper facilities, would pass through, and benefit your city.

The favorable geographical position of Buffalo, on which so much dependence is placed, has failed to save her, and her only salvation now depends upon the public spirit and enterprise of her citizens, and their determination to aid in starting and carrying out the scheme proposed, to make a fixed and permanent connection with Canada, and by that means form a link in the chain which will make a continuous unbroken line of railway from New York to Chicago, and the great country west, by the north as well as the south shore of Lake Erie. What Buffalo has lost, cannot be regained till this project becomes a reality. Hence the necessity of immediate action. That the work must be done is a settled question, and it is quite gratifying to me to see so much interest evinced on the subject, by the citizens generally, and the press.

The rising empires west will call more and more for increased facilities for transportation to New York and Boston, and as Buffalo, already a large commercial city, situated at the foot of the great chain of lakes, with a population of over 75,000, and real estate assessed to the amount of 30,000,000 of dollars, is on the direct route, it is only necessary to carry out this plan, to insure her a more rapid growth, and entitle her still to the appropriate and dignified name of Queen City.

The following is a copy of a letter addressed to His Honor the Mayor, the Mayor's communication to the Common Council, and the estimated cost of the work :—

BUFFALO, Oct. 5, 1855.

DEAR SIR:—In March, 1852, I published a report showing the importance and feasibility of a tunnel under the Niagara river, the benefit Buffalo would derive by having a fixed connection with Canada, &c. I also stated that this might be considered a work of some magnitude; but that in accordance with the spirit of the times, it must be done. I soon found, however, that the project was then looked upon as visionary, and I concluded not to press the subject, but wait till "future events" should demonstrate more clearly the necessity of the work.

That the project is entirely feasible is a settled question, and you will see, by the accompanying estimate, that the amount of capital required is comparatively small.

The map and profile will, I have no doubt, enable you to lay the whole subject clearly before the Common Council; and I hope they will not fail to pass a resolution to adopt the plan, and take steps to procure a charter.

Great projects are in contemplation and in progress in different parts of the world, but I know of no work of the same magnitude that is more necessary than this, or that can be accomplished with greater facility.

Engineers are now engaged estimating the cost of a tunnel under the channel between England and France, a distance of $18\frac{1}{2}$ miles; but I trust before one mile of this bold scheme is constructed, thousands of visitors from every clime will stand on the banks of the Niagara, and gaze with wonder and delight at the trains as they enter the tunnel, and watch with eager expectation to catch the first view as they ascend from their subterranean passage on the opposite side.

Most respectfully,

Your obedient servant,

WILLIAM WALLACE.

To the Honorable the Common Council of the city of Buffalo.

GENTLEMEN :—The importance to our city of opening a convenient means of communication with Canada, has been felt by business men and citizens generally, and has been to me the subject of much reflection. To secure the trade of the western states and the western part of Canada, as well as the travel from the west, and to protect ourselves against its diversion through the channels already opened near Niagara Falls, and contemplated by means of a canal from Lake Simcoe to Lake Ontario, should be the desire of all who feel an interest in the growth and future commercial importance of Buffalo.

We have already incurred a debt of \$150,000 for this purpose. Although we have felt the benefits of this communication with Canada, they will not be fully realized until the Buffalo and Brantford road shall be completed to Goderich, and until the trains of cars running on that road can enter a depot in this city. The Great Western Railway, having the advantage of a *viaduct* over the Niagara river, must and will continue to take western freight by that route, until we shall be enabled, by means of like facilities, to pass this stream and reach this city from a point opposite Detroit, without re-shipment of freight. When this is accomplished, the Buffalo, Corning and New York railroad, the Buffalo and New York City, in connection with the New York and Erie Road, will furnish means for the transportation of all the western produce destined for the New York market; while the New York Central road will find its interest best promoted by the transportation of produce for the Boston market by the way of Albany by this route through Buffalo. This, too, will be the most expeditious route for the transportation of merchandise from the east to the west.

That this communication can be made by a tunnel under the river, must be admitted to be unquestionable. A plan of such a work has been prepared by William Wallace, Engineer, which is herewith submitted for your examination, together with an estimate of the expense of the work.

It is not proposed or expected that the city will incur any pecuniary liability in the construction of this work.

I entertain no doubt whatever that a company will be readily organized that will subscribe for, and take all the stock necessary, and press the work to an early completion; and therefore feel justified in saying that, in my judgment, so great will be the demand for this stock, that there is no probability of any demand upon the city to take any part of it.

My object in bringing this subject to your attention is, that you will give it the consideration its importance demands, and unite with citizens in procuring the charter of a company and the right of way for such lands as may be required to carry out this enterprise.

If you shall concur in the views I have presented, I shall be happy to co-operate with you in all acts deemed expedient for the accomplishment of this great work.

MAYOR'S OFFICE, BUFFALO, }
Oct. 15, 1855.

ELI COOK, Mayor.

ESTIMATE.

TUNNEL UNDER NIAGARA RIVER, 4100 FEET IN LENGTH.

76,782 C. Y. Rock Excavation in Tunnel, @ \$3 50,.....	\$268,737 00
10,394,000 Brick, @ \$8 00 per thousand, in Wall,.....	82,984 00
Stationary Engines and Pumps, including all Working Expenses for 2½ years,.....	78,495 00
8,000 feet of Ventilation Pipe of pine board, @ \$20 00 7/8 thousand, B. M.,.....	640 00
Entrance Arches of Tunnel, of cut stone, @ \$500 00 each,.....	1,000 00
For Engineering and Contingencies, 10 7/8 cent,.....	43,185 00
Total,.....	\$475,041 00

THOROUGH CUT.

98,996 C. Y. Rock Excavation, @ \$1 50,.....	\$148,494 00
94,629 C. Y. Earth Excavation, @ \$0 20,.....	18,925 00
For Engineering and Contingencies, 10 7/8 cent,.....	16,472 00
Total,.....	\$183,891 00
	\$658,932 00

TUNNEL UNDER PART OF CITY, 1400 FEET IN LENGTH.

22,437 C. Y. Earth Excavation in Tunnel, @ \$0 25,.....	\$ 5,609 25
32,655 C. Y. Earth Excavation in Cuts, @ \$0 20,.....	6,531 00
4,384,000 Brick in Tunnel, @ \$8 00, in Wall,.....	35,072 00
603,000 Brick in Thorough Cuts,.....	4,221 00
24,762 C. Ft. of Coping Stone, @ \$1 00 7/8 foot,.....	24,762 00
5,080 feet of Iron Railing, @ \$1 92 7/8 foot,.....	9,753 00
For Engineering and Contingencies,.....	8,595 00
Total,.....	\$ 94,543 85
Three miles of Railway,.....	100,000 00
Total Amount,.....	\$853,475 00

Since submitting the above estimate, and a Plan and Profile of the work, to the Mayor, the Plan and Profile have been reduced to a small scale, which, together with a Map showing the lines of Railway between New York and Chicago, in connection with the lines through Canada, accompany this, and which, I have no doubt, will convey to your minds a correct idea of the whole scheme, and its great importance and necessity.

A description of the proposed connecting link is unnecessary, as you will see it distinctly shown on the Map by the red line. The Niagara tunnel will be of sufficient width for a single track Railway and the free passage of carriages. Its position is also distinctly marked out on the Plan, and you will see by the Profile that the descent from both sides to the level grade near the centre is only 75 feet per mile, which, for so short a distance, is comparatively light. On the Western Railway, from Albany to Boston, there is one grade of 80 feet per mile, for a distance of 12 miles, and there are still heavier grades on other lines.

To enable you to draw a comparison between the magnitude of this and other works of a similar character, I will here state some facts, taken from the report, dated March, 1852, referred to in my letter to His Honor the Mayor:

"The proposed tunnel under the Niagara presents nothing very formidable, when compared with the magnitude and proportions of other tunnels in different parts of the world. All the difficulties which formerly belonged to that class of works, have been fully overcome, and the practical experience of the present day renders such a work not only feasible, but in no way difficult.

"When we enumerate some of the tunnels constructed on the various railroad projects in Europe, it may be said few of them pass under a river—but even examples of this kind are not wanting. The Thames Tunnel is, of course, well known to be a work which abounded with difficulties, in every way calculated to oppose all the skill and energy of its bold projectors; but this work, with all the obstacles which had to be overcome, is now a standing monument of the age we live in. On the Lyons and St. Etienne Railroad, there are several tunnels, one of which is over a mile in length, and another, which passes under the bed of a river, is upward of half a mile long. To speak of tunneling in England, it would be difficult to know where to begin. The country, in every direction, is pierced with them.

"The Kilsby Tunnel, on the London and Birmingham Railway, is over a mile and a half in length, and one thousand three hundred and fifty feet of the distance is through a quicksand, which required to be pumped dry. The

pumps brought up two thousand gallons of water per minute, and were worked during a period of nine months.

"The Box Tunnel, on the Great Western Railway, through Oolite Rock, is one and three quarter miles in length.

"There are eight tunnels on the Manchester and Leeds Railway, in a distance of sixty miles, one of these, at the summit, being one mile and five eighths in length.

"On the Liverpool and Manchester Railroad, there are three tunnels; one of them is six thousand six hundred feet long.

"On the Edinburgh and Glasgow, there are five tunnels in the short distance of forty-six miles.

"On the London and Dover line, there are several tunnels. The Abbot Cliff Tunnel is six thousand six hundred and nine feet long; and between Manchester and Huddersfield, there is a tunnel through Blackstone edge, three miles in length.

"Tunneling is no new thing in this country, and is becoming more and more extensive.

"The tunnel, on the Chesapeake and Ohio Canal, is three thousand one hundred and eighteen feet long.

"The place selected for a tunnel under the Niagara, is the shortest crossing between Fort Erie and the American side. The river flows over a bed of solid stratified rock, and is 24 feet deep at the proposed site. These are facts eminently favorable to the process of tunneling, avoiding heavy expenses of deep excavations and heavy grades to and from the tunnel."

From the above statement of facts, it will be seen that other works have been executed of greater magnitude than this, and if the friends of the project remain firm and steady to their purpose, the work can soon be accomplished.

An engineer, in the service of the Sardinian Government, has offered to undertake to pierce a tunnel through the Alps, 8½ miles in length, without any opening from above. Contrast a work like this with the work in question, and the magnitude of the undertaking appears to diminish, and as the future growth and prosperity of Buffalo, I might almost say, her rise or downfall, depends upon the success of this scheme, all parties will, I trust, however divided on other subjects, be united on this.

To unite Canada and the United States, by means of such a work, is a noble undertaking, and will be highly approved of by all the intelligent of both countries.

To prevent loss or disappointment to parties who may become stock-

holders, the work should be put under contract to responsible contractors, who will give a sufficient guarantee that it will be done for a fixed sum. This would give confidence to the subscribers, and the stock would be readily taken.

Since submitting the estimate of the proposed work to His Honor the Mayor, I have heard some doubts expressed whether the estimated amount will be sufficient to cover the entire cost. Such doubts, however, I think, can easily be removed, and I will here state that the tunnel of the Credo, on the Lyons and Geneva line of Railway, $2\frac{1}{2}$ miles in length, has been let to a company at \$15.00 per lineal foot less than the estimated cost of the tunnel proper under the Niagara, which is equal to \$61,500 on the whole length of the Niagara Tunnel.

The projected line through Canada, as shown on the Map, now called the Great Southern, was formerly known as the Niagara and Detroit Rivers Railway. This line was projected, a number of years ago, by prominent men in Canada, and surveyed by Elisha Johnson, Esq., but the charter expired. A charter, however, has again been obtained for part of the distance, but, I believe, it is the intention of its present promoters to make the eastern terminus at the Suspension Bridge. As this is a project in connection with the tunnel, in which you are all deeply interested, I herewith submit the following brief Report and an estimate made during the last session of Parliament, at the request of the Hon. W. H. Merritt.

REPORT.

HON. W. H. MERRITT.

In accordance with your instructions I have ascertained the distance from Amherstburgh to Simcoe, and estimated the cost of that portion of the North Shore Railway which lays between these two places. As this constitutes the Western Division of the Niagara and Detroit Rivers Railway, as contemplated several years ago, and as you are already in possession of reports on the Eastern Division, made by myself and other engineers, I will only at present report on this part of the line, and, before entering upon the details of the survey, will lay before your notice some general observations on the tract of country which would be benefited by a Railway on or near the line surveyed.

You are already familiar with the position of the entire line from the Niagara River to the Detroit River, as originally contemplated by yourself and other leading gentlemen in the province, a portion of which is now occupied by the Brantford Railway, viz., that laying between Fort Erie and Dunnville.

In referring to the reports above mentioned, with a view of estimating the cost of construction, you will recollect that work done at the present day will cost more than the same description of work done at the time said reports were made.

Amherstburgh is the western terminus of the proposed line, and Gibraltar, opposite that port, is the best terminus for the Michigan Southern line in connection with it. The width of the river between Amherstburgh and Gibraltar is five and a half miles, and the distance from Gibraltar to Monroe is nineteen miles. The average depth of water, where a ferry boat would cross, is seven feet, and the greatest depth is ten feet, except the main channel, which is eighteen feet. A bridge could easily be built here, at a moderate expense, by driving piles.

From Amherstburgh to a point distant about fifty-five miles, the country is remarkable for the extraordinary facilities which it presents for the construction of a railway. By reference to the map, it will be seen that it embraces the peninsula lying between Lake St. Clair, the Detroit River, and Lake Erie. In this distance, there will, in no case, be more than ten feet excavation, which occurs only in one narrow ridge. With this exception, the maximum cutting will not exceed five feet.

For a distance of about seven miles from Amherstburgh, the ground presents a gently undulating surface: the soil a light clayey loam, with occasional indications of gravel. From this point to the east side of the Tilbury Marshes near the mouth of the Thames, the country is almost entirely free from undulations, and, with the exception of a few clearings, is covered with a heavy growth of forest. The soil is a clay of moderate tenacity, based on a stiff subsoil, which retards the absorption of the spring and fall waters, which, as far as could be ascertained, are sometimes about two feet deep on the level during the freshets. It will be necessary to raise the grade line three or four feet above the level of the present surface, by the earth taken from the side ditches, so as to place the track above all danger of being overflowed. These inundations will almost entirely cease when the country is cleared, as the settlers would have to construct drains to take off the surface water. The removal of the forest growth would also, by preventing large accumulations of snow during winter, and by allowing rapid evaporation at other seasons, further tend to the same results.

It is seldom that a growth of timber of such size and of so valuable varieties is met. The white and red oak grow here in great abundance, and of uncommon size; as also the black walnut, tulip tree or white-wood, button-wood, white ash, chesnut, hickory, elm, and other varieties of timber. Thence, for a distance of twenty-five miles, the face of the country presents features differing, in some respects, from the preceding. The ground is slightly undulating, and interspersed with ash swamps, which, however, offer no difficulties, as the bottom is perfectly sound, the stiffness of the soil above retaining the surface water.

The agricultural character of the land is excellent; yet, for want of proper channels of communication, it remains almost in a state of nature. A portion of the township of Oxford, in particular, presents some of the finest lands in Canada West; the timber is mostly beech, maple, oak, chesnut, and white-wood. The country, for the next twelve miles, is generally swampy, and intersected with numerous small ridges. Ninety-four miles from Amherstburgh, the dividing ridge between the waters emptying into

the Thames and those running southerly to Lake Erie, is crossed with a grade, for about one and three quarter miles, of twenty-seven feet to the mile. From this last mentioned point to St. Thomas, the face of the country is broken by creeks, running to the lake.

St. Thomas is a flourishing town, forming a mart for the produce of the very fertile and highly cultivated country constituting the Talbot settlement. Near this place, the contemplated line is intersected by that of the London and Port Stanley Road. Kettle Creek, which passes through St. Thomas, affords numerous mill sites, and there can be no doubt that wheat, flour, and other agricultural produce, would be transported in vast quantities over the road from this section of the country. The distance from St. Thomas to Simcoe is forty-five miles, and the summit, between Lake St. Clair and the Niagara river, is found about half way between these two places. To surmount this, a grade of thirty feet to the mile will be required for about a mile on each side, which is the heaviest grade on the line. Between St. Thomas and Simcoe, three streams are crossed, the Catfish, Otter, and Big Creeks. The average width of the valleys is about one thousand feet. By a line run more to the northward, passing near Oterville, the Catfish would be crossed at a point where the banks are low, and its waters might be passed through a six feet culvert. The Otter would present banks of not more than twenty feet in height, and might be crossed with a common trestle bridge. Big Creek would offer still less difficulties, the banks being very low and the stream insignificant. The estimate, however, is made on the line surveyed, subject to the modification above mentioned.

Having thus given some account of the different portions of the country traversed by the line, I beg, before submitting the estimate, to offer a few general remarks on the whole line of country crossed by the proposed road.

In the first place, there is a large extent of uncultivated land, abounding in resources, and awaiting development. Secondly. There is a cultivated tract, second to none in Canada, settled by men whose energies have accomplished much in overcoming the disadvantages under which they still, to some extent, labor.

Numerous flourishing towns and villages are so situated as to receive great benefit from this line. Steam mills are being everywhere erected, and the streams above named abound in water privileges. In short, it is impossible to pass over this section of the province without being impressed with feelings of admiration at the extent of its resources, and of regret at their not being duly developed.

Having now presented you with the foregoing brief statement of facts, setting forth not only the feasibility but importance of the proposed railway, I beg, in conclusion, to subjoin the following table of grades and estimate of costs:

TABLE OF GRADES.

	MILES.	CUB.
Level,	35	50
Nearly level, less than 5 feet per mile,.....	22	40
Under 10 feet,	40	10
From 10 feet to 15 feet per mile,.....	26	70
" 15 " 20 " "	12	00
" 20 " 25 " "	9	20
" 25 " 30 " "	7	50
From Detroit River to Simcoe,	154	00

ESTIMATE OF COST.

Right of Way, including Depot Grounds,.....	\$ 75,000 00
Fencing,	98,500 00
Clearing and Grubbing,.....	75,000 00
2,250,000 yards of Earth-Work, @ 15 cents,	337,500 00
Bridges, Culverts, Cattle-Guards and Road-Crossings,	175,000 00
Superstructure, including 6 miles of Side-Track,.....	1,280,000 00
Ballasting,	125,000 00
Station-Houses, Workshops and Machinery,.....	84,000 00
Add 10 per cent. for Engineering and Contingencies,	225,000 00
Rolling Stock,.....	425,000 00
	\$2,900,000 00

The above estimate is sufficiently liberal to cover the entire cost of a first class railway, including rolling stock, to consist of twenty locomotives, twenty first class passenger cars, one hundred freight, and a sufficient number of platform, gravel, and hand cars. Add to this, say \$600,000 to build and equip the extension from Simcoe to Dunnville, and you will see that \$3,500,000 is the capital required.

Most respectfully,

Your obedient servant,

WILLIAM WALLACE, *Engineer.*

You will see by the map referred to, that if the Great Southern and Goderich lines were completed, that portion of the distance from Dunnville to Fort Erie would form a grand avenue to the mouth of the proposed tunnel, and thence to the depots of the New York and Boston lines in your city. That these lines will be completed may be looked upon as a fixed fact, as it is quite evident that the general prosperity of the country demands them.

If the Great Southern is not built by a new company, it is very likely that it will be by the Great Western. Collisions are already more frequent on Lake Erie (the channel of communication marked out by nature) than on any single track Railway, and the time is not far distant when there will be more than two single lines between the Niagara and Detroit Rivers, and the question *is*, will the main terminus be at the *Suspension Bridge* or *Buffalo*?

No other company can work the Brantford Railway with so much advantage to themselves, or benefit to Buffalo, as the Great Western; and I would not be surprised to see this line fall into their hands. Should this be the case, the traffic between the east and the west would immediately upon the completion of the proposed work, take its own legitimate course, and Buffalo would, for all coming time, maintain her true position.

Most respectfully,

Your obedient servant,

WILLIAM WALLACE.

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